REQUEST FOR RECONSIDERATION

Claims 1-6 and 8-13 and 19-20 remain active in this application.

The claimed invention is directed to a process for the preparation of dendritic or hyperbranched polyurethanes, dendritic or hyperbranched polyurethanes and methods for producing reaction products of dendritic or hyperbranched polyurethanes.

Dendritic or hyperbranched polyurethanes have found industrial applicability but have suffered from costly and complex preparation techniques. Simpler and less costly techniques are sought.

The claimed invention addresses this problem by providing a method for preparing dendritic or hyperbranched polyurethanes by reacting diols or polyols having **1) at least one tertiary nitrogen atom; and 2) at least two hydroxyl groups, having differing reactivity** toward isocyanate groups, with diisocyanates of polyisocyanates. Applicants have discovered that reaction of diols or polyols having **at least one tertiary nitrogen atom and at least two hydroxyl groups, having differing reactivity** toward isocyanate groups to provide a simple method for the preparation of dendritic or hyperbranched polyurethanes. Such a process and dendritic or hyperbranched polyurethane are nowhere disclosed or suggested in the cited reference of record.

The rejection of claims 1-6 and 8-20 under 35 U.S.C. §103(a) over Perez et al. U.S. 4,786,682 in view of Bruchmann et al. U.S. 6,376,637 is respectfully traversed.

None of the cited references disclose or suggest a diol or polyol having **at least one tertiary nitrogen atom and at least two hydroxyl groups of differing reactivity** towards isocyanate groups being reacted in two steps to prepare a dendritic or hyperbranched polyurethane.

Perez et al. merely describes a Michael addition product formed by reacting a material (a) one or more primary and/or secondary amino groups and additionally contains one or

more hydroxyl groups with a material (b) containing at least two α,β-ethylenically unsaturated moieties wherein **the addition product** contains hydroxyl functionality (column 2, lines 11-23). The hydroxyl groups in the Michael adduct are capable of reacting with a curing agent in the formation of a coating composition, forming a crosslinked film (column 6, lines 3-8).

The advisory action of December 22, 2009 suggests the motivation to use the hydroxyl groups in the Michael addition product in the formation of a dentritic or hyperbranched polyurethane.

A Compound Containing At least Two Hydroxyl Groups Of Different Reactivity Is Not Suggested By Perez et al.

Perez et al. identifies reaction of compounds (a) such as a dialkanolamine with compounds (b) having at least two α,β-ethylenically unsaturated moieties. As compound (b), preferably is suggested ethyleneically unsaturated materials as acrylate functionalities (column 2, lines 53-67). Suitable acrylate functional materials are identified as polyol polyacrylates of which polyesterpolyol polyacrylates are given as an example (column 3, lines 6-17). One method of preparing a polyesterpolyol polyacrylate would be to react a **hydroxyalkyl acryalte with a lactone** (column 4, lines 4-6), followed by reaction with a dicarboxylic acid in the formation of a polyester polyol polyacrylate. This polyester compound has **no hydroxyl groups** such that upon reaction with compound (a), a Michael addition product will not be formed having at least two hydroxyl groups of different reactivity. In the absence of the formation of a compound having at least two hydroxyl groups of different reactivity, the combination of this reference with Bruchmann et al. fails to suggest the claimed invention.

A Michael Addition Product Of A Compound With Tertiary Amine And Hydroxyl Containing Acrylate Is Not Suggested

The advisory action suggests that reaction of compound (a) a compound with at least two hydroxyl groups and an amine with a hydroxyl acrylate would yield a Michael addition product which would have at least two hydroxyl groups of different reactivity.

As discussed above, a hydroxyl acrylate is not suggested as a reactant in a Michael addition reaction with a compound (a) as a dialkanoamine. The hydroxyl acrylates are described as reactants with lactones in the formation of polyesterpolyol polyacrylates (column 4, lines 4-20) and as reactants with polyisocyanate in the formation of a urethanepolyol polyacrylate (column 4, lines 21-47). Thus, hydroxyl acrylates are not described or suggested as Michael addition reactants.

Even though the reference allows for the modification of these adducts to contain hydroxyl groups (column 4, lines 18-20 and lines 43-47) such modification does not suggest inclusion of hydroxyl groups such that reaction in the Michael reaction would provide a compound having at least two hydroxyl groups of different reactivity.

Examination of example 1 in which a Michael adduct is formed by reacting diethanolamine with 1,6-hexanedioldiacrylate would not suggest a compound having at least two hydroxyl groups of different reactivity since h,6-hexanedioldiacrylate does not have any hydroxyl groups. 1,6-hexanedioldiacrylate is formed by reacting the two primary hydroxyl groups of 1,6 hexanediol, with two equivalents of acrylic acid. As such, the exemplified Michael adduct does not suggest incorporation of hydroxyl group into component (b) to provide at least two hydroxyl groups **of different reactivity**.

Since it is not intuitively obvious to prepare a Michael addition adduct according to Perez et al. such at the adduct would have at least two hydroxyl groups of differing reactivity,

the claimed invention would not have been obvious from the combined disclosures of the cited references.

In contrast, the claimed invention is directed to **a process** for preparing a dendritic or hyperbranched polyurethane by reacting a diol or polyl having at least one tertiary nitrogen and at least two hydroxyl groups of **differing reactivity**, in which higher reactivity hydroxyl groups are predominantly reacted with isocyanate groups in a first step and lower reactivity hydroxyl groups are reacted with isocyanate groups in a second step. Since Perez et al. only describes **a single reaction step** with a polyisocyanate, the claimed process in which hydroxyl groups are reacted in first and second steps, would not have been rendered obvious by this reference.

While Bruchmann et al. has been cited for a process of preparing dendritic and highly branched polyurethanes, such is not a disclosure of reacting a compound having a tertiary nitrogen atom and at least two hydroxyl groups of differing activity.

Furthermore, one of ordinary skill in the art would not be motivated to combine the disclosures of Bruchmann et al. with Perez et al.

Perez et al describes coating compositions, which in addition to the Michael addition product of reacting (a) and (b) contains a curing agent adapted to **cross-link** with the primary hydroxyl functionalities present in the Michael adduct (column 2, lines 4). Such crosslinking is not suggestive of dendritic or highly branched polyurethanes. One of ordinary skill in the art would recognize the differences between crosslinked polyurethanes and dendritic or highly branched polyurethanes such as in differing solubility such that the two disclosures would not be combined.

In view of the deficiencies of the disclosures of the cited art, the claimed invention would not have been obvious and withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

Applicants submit that this application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Richard L. Chinn, Ph.D.
Attorney of Record
Registration No. 34,305

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)